

US EPA ARCHIVE DOCUMENT



R.E.D. FACTS

Tris(hydroxymethyl)-nitromethane

Pesticide Reregistration

All pesticides sold or distributed in the United States must be registered by EPA, based on scientific studies showing that they can be used without posing unreasonable risks to people or the environment. Because of advances in scientific knowledge, the law requires that pesticides which were first registered years ago be reregistered to ensure that they meet today's more stringent standards.

In evaluating pesticides for reregistration, EPA obtains and reviews a complete set of studies from pesticide producers, describing the human health and environmental effects of each pesticide. The Agency imposes any regulatory controls that are needed to effectively manage each pesticide's risks. EPA then reregisters pesticides that can be used without posing unreasonable risks to human health or the environment.

When a pesticide is eligible for reregistration, EPA announces this and explains why in a Reregistration Eligibility Decision (RED) document. This fact sheet summarizes the information in the RED document for the reregistration case Tris(hydroxymethyl) nitromethane, which contains the active ingredient 2-(hydroxymethyl)-2-nitro-1,3-propanediol.

Use Profile

2-(hydroxymethyl)-2-nitro-1,3-propanediol is used as a microbicide and bacteriostat in disinfectants and industrial preservatives. Specifically, it is used as an industrial preservative in metalworking fluids, secondary oil field recovery waters, paper mills and commercial/industrial water cooling systems; as an in-can preservative in latex paints, polishes and detergents; and as a disinfectant to control disease organisms in livestock and poultry areas on farm premises and equipment. It is formulated as a soluble liquid concentrate, powder or pellets, and is applied through use of a metering pump in industrial water systems, by pouring into paints and polishes, and as a spray to farm areas and equipment.

Regulatory History

2-(hydroxymethyl)-2-nitro-1,3-propanediol was first registered in the U.S. in 1955, as an industrial bactericide and slimicide. EPA has issued three relevant Data Call-In (DCI) Notices: the Antimicrobial DCI in March 1987, the comprehensive reregistration Phase 4 DCI in September 1992, and a third DCI in August 1993, the latter for residue data. Currently, nine pesticide products are registered which contain this active ingredient.

Human Health Assessment

Toxicity

Studies using laboratory animals indicate that 2-(hydroxymethyl)-2-nitro-1,3-propanediol is of low to moderate acute toxicity to mammals. It has been placed in Toxicity Category III for acute oral, dermal and inhalation effects (Toxicity Category I indicates the greatest degree of acute toxicity and Category IV the lowest). It has been placed in Category IV for eye and skin irritation effects. Since these studies were not conducted with the technical grade (100%) powder, additional confirmatory acute inhalation and eye irritation studies are required using that formulation.

In a subchronic dermal toxicity study using rats, there were no treatment-related effects observed at any dose level. In developmental toxicity studies using rats and rabbits, treatment-related maternal effects were observed in the high-dose groups. No mutagenic effects were seen in a battery of studies.

2-(hydroxymethyl)-2-nitro-1,3-propanediol decomposes to formaldehyde under alkaline, warm conditions. Formaldehyde has been classified by EPA as a Group B1 "probable" human carcinogen. The toxicity of formaldehyde has been a primary consideration in evaluating the risks of 2-(hydroxymethyl)-2-nitro-1,3-propanediol.

Dietary Exposure

No dietary exposure is expected as a result of the registered uses of 2-(hydroxymethyl)-2-nitro-1,3-propanediol. Its one potential food use, as a disinfectant in or on livestock premises and equipment, has been modified to delete milk house and milking equipment uses, and to add restrictions to poultry house uses which eliminate the means of exposure of edible livestock tissue or eggs. Therefore, no tolerances (maximum residue limits) or exemptions from tolerances are required.

Occupational and Residential Exposure

2-(hydroxymethyl)-2-nitro-1,3-propanediol has many uses that may involve exposure to workers, and exposure monitoring data were required to estimate combined inhalation and dermal exposure of mixers, loaders and applicators in various use sites.

Worker exposure is considered significant for preservative and pulp and paper mill uses, which involve open pouring methods. However, associated risks will be mitigated ten-fold by requiring use of a respirator and personal protective equipment (PPE) including a long-sleeved shirt and long pants, and shoes plus socks.

Worker exposure is considered low for the poultry/livestock disinfectant use, but is of concern since formaldehyde is an active ingredient in the product, and since a spray method of application is involved. Use of PPE and a respirator are required, and will reduce any exposure ten-fold.

Worker exposure during cooling tower and metal working fluid uses is considered very low. Again, PPE is required to reduce possible exposure to formaldehyde.

While post-application worker exposure to formaldehyde is minimal for most uses of 2-(hydroxymethyl)-2-nitro-1,3-propanediol, the disinfectant spray used in livestock/poultry premises, which contains the active ingredient formaldehyde, causes post-application exposure of concern. However, EPA's exposure estimate represents the worst case scenario, and OSHA requires monitoring for formaldehyde before workers may reenter treated premises. Therefore, post-application worker exposure is likely the same or less than exposure during mixing, loading or applying the pesticide.

Similarly, post-application worker exposure to formaldehyde from use of the parent chemical in pulp and paper mills is of some concern. Since the Agency's exposure estimate is very conservative, a post-application inhalation exposure monitoring study is required only as confirmatory data.

Human Risk Assessment

Since 2-(hydroxymethyl)-2-nitro-1,3-propanediol has no food uses, no dietary risk exists. Overall, minimal risk and exposure are associated with the use of this active ingredient. The risks associated are due to its degradation product, formaldehyde.

EPA has examined the cancer risks of formaldehyde extensively. Using the most widely accepted risk assessment methodology, the Agency has estimated the refined upper bound cancer risk to mixers, loaders and applicators from exposure to formaldehyde through use of 2-(hydroxymethyl)-2-nitro-1,3-propanediol. With PPE and respirators, these risks range from 1.1 in 100,000 for preservative uses to 2.5 in 1,000,000 for poultry/livestock disinfectant uses.

Post-application worker exposure to formaldehyde following the livestock/poultry premise spray use is of concern; the upper bound risk to workers is estimated to be 2.5 in 1,000,000. However, the Agency's exposure estimate represents the worst case scenario. Actual risks to workers should be lower considering OSHA's formaldehyde monitoring requirements. Post-application exposure of pulp and paper mill workers is conservatively estimated to be 2.7 in 100,000. A post-application inhalation

Environmental Assessment

exposure monitoring study is required for this use, as confirmatory information.

In evaluating environmental effects, EPA focused on 2-(hydroxymethyl)-2-nitro-1,3-propanediol rather than its degradation product, formaldehyde. In the aquatic environment, the active ingredient is relatively stable. As it breaks down to formaldehyde, the latter chemical is rapidly dissipated. Therefore, the parent compound is of greater interest.

Environmental Fate

Based on the results of an exposure assessment model, the Agency expects that 2-(hydroxymethyl)-2-nitro-1,3-propanediol used according to the label will result in minimal exposure to the environment. Concern would arise only from its discharge into receiving waters from the industrial uses or in the case of spills, accidents or misuse. A hydrolysis study is required to confirm the chemical's degradation in the environment.

Ecological Effects

2-(hydroxymethyl)-2-nitro-1,3-propanediol has a low order of acute oral and dermal toxicity to terrestrial mammals. It may be slightly toxic to upland game birds, but is practically non-toxic to waterfowl. It also is practically non-toxic to freshwater fish species on an acute basis. It is slightly toxic to freshwater aquatic invertebrates and mollusks, and practically non-toxic to crustaceans.

Ecological Effects Risk Assessment

EPA conducted a Tier Ic Estimated Environmental Concentration (EEC) model to assess the residue levels of 2-(hydroxymethyl)-2-nitro-1,3-propanediol in the receiving stream from several use sites. This model provides a reasonable worst case estimate of the maximum concentration that may occur immediately downstream from an industrial point source discharge site. The typical EEC values for all uses of this active ingredient are below the levels of concern for fish and invertebrates. Therefore, the pesticide can be used at typical use sites without producing effluent above levels of concern. Under a high exposure scenario, a high degree of risk would be posed to aquatic organisms. However, discharge of the pesticide is regulated by the National Pollutant Discharge Elimination System (NPDES) permit program administered by EPA. Through this program, the Agency is able to control the discharge of this pesticide and other chemicals so that toxic levels are avoided.

Endangered Species

The high exposure scenarios described above exceed the levels of concern for endangered aquatic organisms. In addition, the typical EEC value for pulp and paper mills exceeds the level of concern for endangered aquatic invertebrates. Effluent containing this active ingredient should not be discharged into streams or waterways where endangered aquatic organisms are known to reside. EPA is working with the U.S. Fish and Wildlife Service to develop a program to avoid jeopardizing the continued

existence of identified species by the use of pesticides. When this program goes into effect, endangered species labeling will be required.

Additional Data Required

The generic data base for 2-(hydroxymethyl)-2-nitro-1,3-propanediol is substantially complete. However, for confirmatory purposes, EPA is requiring acute inhalation and eye irritation studies using the technical grade powder formulation, a post-application inhalation exposure worker monitoring study, and a hydrolysis study. EPA also is requiring product-specific data, including chemistry, acute toxicology and efficacy studies, as well as revised labeling for reregistration.

Product Labeling Changes Required

All end-use products containing 2-(hydroxymethyl)-2-nitro-1,3-propanediol must comply with EPA's current pesticide product labeling requirements. In addition:

- **Effluent Discharge Statement** - All end-use products for indoor non-food uses (industrial uses which discharge effluent), aquatic non-food industrial uses, or terrestrial non-food uses must bear the following effluent discharge statement:

"Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or public waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of EPA."

- **Use Site PPE Requirements and Entry Restrictions**

- In poultry/livestock premises, preservative and pulp and paper mills, the PPE requirement for mixer/loader/applicators is:

"Pesticide handlers must wear:

- Long-sleeved shirt and long pants
- Chemical-resistant gloves
- Shoes plus socks

In addition, when engaged in pouring this product,

- A respirator with either an organic-vapor-removing cartridge with a prefilter approved for pesticides (MSHA/NIOSH approval number prefix TC-23C), or a canister approved for pesticides (MSHA/NIOSH approval number prefix TC-14G)."

- For metal working fluids and cooling tower water uses, the PPE requirement for mixer/loader/applicators is:

"Pesticide handlers must wear:

- Long-sleeved shirt and long pants
- Chemical-resistant gloves

--Shoes plus socks"

- In poultry/livestock premises, post-application workers must observe the following use restriction on the labeling in the directions describing use as a disinfectant spray:

"Entry by any person--other than a correctly equipped handler--is PROHIBITED in the entire enclosed building/structure from the start of application until aeration reduces the air concentration level of formaldehyde in the working area to less than 0.75 ppm. The air level concentration of formaldehyde must be measured before entry is permitted. (OSHA issued a final rule for the PEL for formaldehyde as 0.75 ppm, May 27, 1992, Federal Register, Vol. 57, p. 22290.) Any handler who enters the treated area during this entry-restricted period must wear:

--Long-sleeved shirt and long pants

--Shoes plus socks

--A respirator with either an organic-vapor-removing cartridge with a prefilter approved for pesticides (MSHA/NIOSH approval number prefix TC-23C), or a canister approved for pesticides (MSHA/NIOSH approval number prefix TC-14G)."

Regulatory Conclusion

The currently registered uses of 2-(hydroxymethyl)-2-nitro-1,3-propanediol may pose low level cancer risks to workers from the degradation of formaldehyde, and could pose risks to aquatic organisms under certain conditions as industrial effluent containing the parent chemical is released into receiving waters. However, the uses will not cause unreasonable adverse effects to humans or the environment, and are eligible for reregistration.

Products containing 2-(hydroxymethyl)-2-nitro-1,3-propanediol as the sole active ingredient will be reregistered once the required product-specific data and revised labeling are received and accepted by EPA. Products also containing other active ingredients will be reregistered only after the other active ingredients also are determined to be eligible for reregistration.

For More Information

EPA is requesting public comments on the Reregistration Eligibility Decision (RED) document for Tris(hydroxymethyl)nitromethane during a 60-day time period, as announced in a Notice of Availability published in the Federal Register. To obtain a copy of the RED document or to submit written comments, please contact the Pesticide Docket, Public Response and Program Resources Branch, Field Operations Division (7506C), Office of Pesticide Programs (OPP), US EPA, Washington, DC 20460, telephone 703-305-5805.

Following the comment period, the Tris(hydroxymethyl)nitromethane RED document will be available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161, telephone 703-487-4650.

For more information about EPA's pesticide reregistration program, the Tris(hydroxymethyl)nitromethane RED, or reregistration of individual products containing the active ingredient 2-(hydroxymethyl)-2-nitro-1,3-propanediol, please contact the Special Review and Reregistration Division (7508W), OPP, US EPA, Washington, DC 20460, telephone 703-308-8000.

For information about the health effects of pesticides, or for assistance in recognizing and managing pesticide poisoning symptoms, please contact the National Pesticides Telecommunications Network (NPTN). Call toll-free 1-800-858-7378, between 8:00 am and 6:00 pm Central Time, Monday through Friday.